AFFECTED ENVIRONMENT

CULTURAL RESOURCES

ARCHEOLOGICAL RESOURCES

Prehistoric occupation of the Crater Lake area could date to more than 10,000 years ago, when extensive mountain glaciers began to recede and hunters followed big game into present-day southeastern Oregon. The great eruption of Mount Mazama, more than 7,700 years ago, left the area around it temporarily uninhabitable. Until Euro-Americans arrived in the area, prehistoric populations from the eastern and western sides of the Cascade Mountains intermittently used the area. Prehistoric uses included hunting, traveling to trade materials such as obsidian (volcanic glass used to make some stone tools), gathering resources such as huckleberries, and practicing traditional spiritual activities in the higher elevations and around Crater Lake.

Archeological survey work has been conducted in the national park since the mid-1960s, and to date less than 1% of the land area has been examined. Until 2001 only ten archeological sites in the park had been officially recorded. These consisted of one lithic scatter, five "vision quest" rock feature sites, three rock feature sites constructed within the last ten to thirty years, and one obsidian source area. Complementing these sites were 18 isolated finds, most of which have been curated by park personnel. These isolates included two finds of obsidian raw materials (chunks or nodule); one isolated obsidian flake; a find of two crytocrystalline (CCS) flakes; 11 obsidian tools or tool fragments; and three CCS tools. The tools are mainly hunting related implements, consisting of ten point and point fragments (projectiles or knives), with one utilized flake, two bifaces, and one unifacially modified flake.

During 2001 a new archeological resource property type — grades and artifacts associated with railroad logging was discovered and recorded during a contracted survey of prospective burn units in the park's northeast quadrant. That area of the park was transferred from Winema National Forest to Crater Lake National Park in 1980 and is part of a much larger logging railroad "network" developed during the 1920s.

Although only a small portion of the park has been surveyed for archeological resources, an archeologist working for the National Park Service has made some predictions about where archeological sites are likely to occur. These sites include small base camps near water resources that are indicated by scatters of stone tools; rock features, such as cairns or piles, stacks, and rings on mountain peaks and high ridges (probably associated with spiritual activities); and hunting sites throughout the park that are indicated by isolated tools such as projectile points. To date, the archeological finds in the park conform to the hypotheses set forth in this predictive model.

None of the archeological sites in the park have been evaluated for listing in the National Register of Historic Places.

ETHNOGRAPHIC RESOURCES

Three Native American groups bordered the Crater Lake area on the west – Molala, Upper Umpqua, and Takelma – while the Klamath Tribes lived to the east. The Klamath Tribes are a confederated tribe that includes people of Klamath, Modoc, and Yahooskin Paiute ancestry as well as descendents of the southern Molalas. Indian lifeways, before disruption by

Euro-American contact, involved seasonal movements from lower-elevation winter villages to hunt and gather a variety of fish, plant, and animal resources throughout their territories. Use of the Cascade Range, such as the present-day Crater Lake National Park area, included the establishment of warmer season camps to hunt animals, gather plant products such as huckleberries, and conduct traditional spiritual activities. Raiding by various Native American groups also occurred in the park area.

Spirit quests took Indian people to isolated places that were believed to possess the powers of certain physical forces and animals that, when acquired, brought success in activities such as gambling, romance, and healing. Those on quests retreated alone to particular places to fast, stay awake for long periods, undertake certain physical activities, and pray, while waiting for an answering vision. Some activities included running, stacking rocks into high piles, and swimming in water bodies thought to possess a sought-after power.

An ethnological overview of the park found Crater Lake to have been an important place of power and danger, highly regarded as a spirit quest site. This study referred to the lake as an important sacred place or landscape; such sites are called "traditional cultural properties" by cultural resource managers, although the boundaries of Crater Lake as a traditional cultural property have yet to be defined and documented. Parts of the lake are associated with mythical events and characters, and parts may be used for contemporary spirit quest rituals.

Members of the Klamath Tribes have identified Mount Scott, Crater Lake, and Huckleberry Mountain as important to traditional use activities. Some plant collection and harvesting probably occurred as a tribal use within park boundaries. Tribal staff have not yet formalized a request to further evaluate these sites as traditional cultural properties under National Register criteria, with the exception of Huckleberry Mountain. The request was transmitted to Rogue River National Forest, although an ongoing traditional use/ethnographic study indicates tribal activities associated with Huckleberry Mountain, the most significant harvesting area on the immediate western edge of present-day Crater Lake National Park, also included portions of the national park within the Union Creek drainage. The ongoing traditional use/ethnographic study has several related components — an appendix funded by the U.S. Forest Service for interviews with tribal members on Huckleberry Mountain, a separate study of anthropogenic fire regimes along the park's western boundary underwritten by the Crater Lake Natural History Association, and a separately contracted exhibit plan focusing on traditional use through consulting with park-associated tribes.

The National Park Service will continue to consult with concerned Indian tribes to learn about possible traditional cultural property sites and how to avoid them. Consultation with the Klamath Tribes will be extended to include National Park Service activities affecting "ceded lands" — areas of the park within the boundaries established by a treaty negotiated in 1864 with the Klamath and Modoc and a group of the Northern Paiutes that ceded vast territories to the federal government and created in compensation a reservation of approximately 1.1 million acres. The treaty established the federally recognized Klamath Tribes and delineated "peak to

peak" — Thielson to Scott and Scott to Pelican Butte — boundaries that include most of the park's southeast quadrant.

HISTORIC STRUCTURES/ BUILDINGS

The documented historic structures/ buildings in Crater Lake National Park are primarily associated with development of the area as a national park. Most of the historic structures and districts in the park represent the activities of the National Park Service or the park's concessioners. These resources, which include some of the nation's best examples of blending rustic architecture and other built features with a national park setting, are located at Rim Village and at park headquarters in Munson Valley.

Historic Structures/Buildings Listed in the National Register of Historic Places

Rim Village. Rim Village Historic District was listed in the National Register of Historic Places in 1997. The historic district, which includes seven contributing structures and other individual features that comprise a designed historic landscape in terms of form and function, are listed under Criterion A for their association with the historical development of Crater Lake National Park and Criterion C for their association with site planning and design by NPS landscape architects and as outstanding examples of rustic naturalistic design in the areas of architecture and landscape architecture. The structures and features were constructed over a 15-year period beginning in 1921.

The seven historic structures in Rim Village are: Crater Lake Lodge, Sinnott Memorial Building, Plaza Comfort Station, Comfort Station behind the Cafeteria (Comfort Station No. 4), Kiser Studio, Community House, and a crenelated stone masonry wall that delineates the promenade and creates a parapet with three observaion bays of varying configurations that extend into the caldera.

Individual features that are historically important to the rustic character of the designed landscape at Rim Village are listed by category. The features listed under the circulation category include roads and parking areas (vehicular circulation) and walkways and four hiking trails (pedestrian circulation) which begin at various points in the district. A promenade extending 3,450 linear feet along the edge of the caldera is the primary pedestrian circulation system for Rim Village. The features listed under vegetation include planting concepts, which illustrate the philosophy behind all plantings in the district, and plant materials, which are the material forms of that philosophy. Small scale features include a variety of detail elements — free standing boulders, stone benches, and masonry details, such as steps and curbing.

Munson Valley. The Crater Lake superintendent's residence at Munson Valley was designated a national historic landmark (NHL) in 1987 because it is an outstanding example of rustic architectural design. According to the National Park Service's *Architecture in the Parks National Historic Landmark Theme Study* (1986), the superintendent's residence "remains an architectural gem – a remnant of an ambitious development project that gave a strong architectural identity to a large park."

The Munson Valley Historic District, which contains the park headquarters area, was listed in the National Register of Historic Places in 1988 under criteria A and C. This nomination designated 18

buildings that contribute to the significance of the district. The structures, which represent prime examples of rustic architecture, were built between 1926 and 1949, although most were designed and constructed between 1928 and 1933. Subsequent landscape analyses have expanded on the significance of this district as a designed landscape and have established its historical significance under national register criteria A, B (for its association with significant persons), C, and D (for the significant information it has yielded or may be likely to yield).

The 18 historic structures that contribute to the significance of the historic district include: administrative building, ranger dorm building, mess hall, warehouse, machine shop, meat house, superintendent's residence (national historic landmark), naturalist's house, six employees' residences, stone woodshed/garage, hospital, transformer building, and comfort station.

Watchman Lookout Station. The Watchman Lookout Station, located on an 8,000-foot peak on the west side of Crater Lake, was listed in the National Register of Historic Places in 1988 under criteria A and C. Constructed during 1932 and designed as both a museum and fire lookout, the building is a unique example of rustic architecture as applied to a specialized building type. The National Register boundary extends 200 feet away from the lookout and trailside museum in all directions.

Historic Structures/Buildings Considered/Determined Eligible for Listing in the National Register of Historic Places

Rim Drive. In June 2003 the Oregon state historic preservation officer determined that Rim Drive was eligible for listing in the National Register of Historic Places. More specifics concerning contributing and non-contributing features will be available as work on the current Rim Drive cultural landscape report and a related corridor management plan for the Volcanic Legacy Scenic Byway continues. Structures and features that contribute to Rim Drive's significance include the roadway's width and right-of-way, embankments, slopes, associated turnouts, and stone retaining and parapet walls. Contributing features included several trails (Castle Crest Wildflower, The Watchman, Mount Scott, Sentinel Point, and Discovery Point) already listed in the cultural landscape inventory.

Jacksonville-to-Fort Klamath Military Wagon Road. In June 2003 the Oregon state historic preservation officer determined that the Jacksonville-to-Fort Klamath Military Wagon Road was eligible for listing in the National Register of Historic Places. The Jacksonville-to-Fort Klamath Military Wagon Road was constructed in 1865 to improve transportation routes in the region. An intermittent, but still ongoing, archeological survey is aimed at documenting features of the main route and spurs totaling some 22 miles in the national park. The main route of the military wagon road parallels State Highway 62 in places, but some segments veer some distance away from the highway, especially the spurs to Rim Village and Thousand Springs. Segments of the historic road are observable in or near various developed areas of the park,

including Rim Village, Munson Valley, the abandoned Annie Spring campground, and Mazama Village. Potential character-defining features include roadbed segments, retaining or embankment walls, blazed trees, campsites, and artifacts associated with use of the road between 1865 and 1915.

Munson Valley Road. In June 2003 the Oregon state historic preservation officer informed the National Park Service that it appears likely that the Munson Valley Road is eligible for listing in the National Register of Historic Places as a linear historic district and that bridges associated with the road should be evaluated as contributing or non-contributing within that district. The Munson Valley Road extends from Annie Spring to Rim Village and is the same road described as the South Entrance Road in this document.

CULTURAL LANDSCAPES

To date the National Park Service has identified 13 cultural landscapes in Crater Lake National Park that are considered potentially eligible for listing in the National Register of Historic Places. These landscapes include what are referred to as "parent" landscapes and "component" landscapes:

Parent/Component
Annie Spring
Lost Creek Campground
Munson Valley/Castle Crest Wildflower Trail, Munson Valley (Bridle) Trail, Superintendent's Residence
Rim Drive/Grayback Road, Mount Scott Trail, The Watchman
Rim Village/Garfield Peak Trails
Wizard Island

Of these landscapes, Munson Valley, Rim Drive, The Watchman, Castle Crest Wildflower Trail, and Rim Village have been documented with a preliminary statement of significance and an existing conditions site plan. The superintendent's residence has been documented with a history narrative, full statement of significance, analysis and evaluation, and a consensus determination of eligibility by the Oregon state historic preservation officer. The aforementioned landscapes are in fair condition with the exception of the Castle Crest Wildflower Trail that is considered to be in good condition and the Lost Creek Campground and Rim Village landscapes which are considered to be in poor condition.

MUSEUM COLLECTIONS

The Crater Lake National Park museum collection consists of more than 200,000 objects divided into two major components — the natural history collection and the cultural collection. The natural history collection consists of biological and geological objects, while the cultural collection consists of archeological, ethnological, historical, and archival objects.

Lack of storage and workspace meeting National Park Service museum standards continues to frustrate efforts to improve care of and access to the collections. Due to limited staffing, the cataloging backlog continues to increase.

Natural History Collection

Collection and maintenance of documented natural history specimens and all associated records in the museum collection are designed to support the park's research/resource management and interpretive programs. The natural history

collection includes representative specimens of taxa found in the park, voucher specimens, and environmental monitoring samples. Currently, no paleontological resources have been identified. Hence, the natural history collection is comprised of biological and geological specimens.

Biological Objects. The biological collections include Monera and Protista, plants and fungi, and animals. Collections made of the Monera and Protista, such as phytoplankton samples obtained in association with the park's lake research, comprise a significant part of the park's museum collection.

The Applegate Collection, the core of the park's vascular plant herbarium, represents the baseline for the park's vascular plants. In addition, the park's museum collection includes ecosystem collections of plants and fungi from research projects in the park's Sphagnum Bog and Pumice Desert areas and mosses collected during lake research projects since the 1930s. The museum collection contains more than 2,000 herbarium sheets containing some 6,000 botanical specimens.

The animal collection contains more than 220 specimens of mammals, representing approximately 70% of the 52 mammal species known to occur in the park. The bird collection contains more than 215 specimens, representing approximately 70% of the 112 bird species known to occur in the park. The reptile and amphibian collection contains more than 375 specimens, representing all of the 14 reptiles and amphibians known to occur in the park. The fish collection contains more than 60 specimens, representing all of the five fish species known to occur in the park. The insect and arachnid collection contains about 1,500 insect and arachnid specimens representing approximately 750 taxa. In addition, the museum collection contains some 340 zooplankton samples and about 40 specimens of other invertebrates.

Geological Objects. The park's museum collection stores some 420 geological specimens onsite. These consist of representative samples of rock types and formations exposed in the park. The U.S. Geological Survey (USGS) office in Menlo Park, California, currently maintains the samples collected by and for Dr. Charles Bacon's continuing research on the national park's geologic history. Due to the size of the collection, it will continue to be stored and used outside the park unless a more suitable facility is found. Evidence indicates that other USGS research has resulted in the collection of geological specimens, in particular collecting done by Dr. Hiroki Kamata of the Vancouver, Washington, office. An estimated 2,000-plus, uncataloged geological specimens collected under previous collection permits are housed by USGS in offsite repositories.

Cultural Collection

The purpose of the cultural collection is to preserve a portion of the national park's cultural heritage and to increase knowledge and appreciation of that heritage through park research, exhibits, and interpretive programs. This collection contains materials from the disciplines of archeology, ethnology, and history (which includes archival/documentary material, photographs and negatives, decorative and fine arts, and historic objects).

Archeological Objects. The museum collection contains more than 20 archeological objects, all occasional finds,

which are primarily prehistoric and of mineral composition.

Ethnographic Objects. The museum collection contains several ethnographic objects — baskets of unconfirmed tribal origin, possibly from the Rogue River region.

Historical Objects. Museum archival and manuscript collections include personal papers, organizational archives, assembled manuscript collections, resource management records, and subofficial records.

The national park's museum collection contains the assembled collection and personal papers of William Gladstone Steel, generally considered to be the park's founder. This collection forms the core of the archival materials already in the museum collection. The Francis G. Lange Collection contains blueprints, tracings, drawings, sketches, correspondence, and photographs that highlight the rustic architecture at Crater Lake and other parks. While the museum collection currently does not contain any organizational records, the archival collections of the Crater Lake Natural History Association, Crater Lake Community Club, or Mazamas would be appropriate collections to consider for inclusion. The museum collection currently contains more than 500 photographs and negatives, some 170 lantern slides, and more than 100 booklets/handbills/reports compiled by various collectors. The museum collection also contains the theses of several individuals who completed research in the park. A large quantity of resource management records (defined as vital non-official records generated by NPS employees, volunteers, contractors, cooperating associations, and other institutions to record information on cultural and natural resources for the purposes of reference or exhibition) that should become part of the museum archives is stored elsewhere in the park as well as at offsite locations. The museum collection contains some subofficial records (defined as copies or duplicates of documents that are useful for reference, administrative histories, interpretation, and research) as a portion of the collections of past NPS employees. The museum collection contains 13 paintings and 20 framed photographs relating to historical figures and scenic views associated with the park's history. The museum collection contains some 30 historic objects, including Steel's signature stamp, wooden benches constructed by the Civilian Conservation Corps, conference table, and parts of the "Cleetwood," the first boat used by explorers on the lake.

LIST OF CLASSIFIED STRUCTURES

The List of Classified Structures (LCS) is a computerized, evaluated inventory of all historic and prehistoric structures having historical, architectural, or engineering significance in which the National Park Service has or plans to acquire any legal interest. Included are structures that individually meet the criteria of the national register or are contributing resources of sites and districts that meet national register evaluation criteria. Also included are other structures — moved, reconstructed, and commemorative structures as well as structures achieving significance within the last 50 years — that are managed as cultural resources, because of management decisions that have been made pursuant to the planning process.

The following structures (with the exception of the Stone Walls Around Reservoir, Garfield Peak, all of these

structures are individually listed in, or determined eligible for listing in, the national register or they are listed as contributing resources of national register-listed sites and districts) are listed in the park's LCS. These include

Rim Village
Sinnott Memorial and Sinnott Memorial Plaque
Kiser Studio
Crater Lake Lodge
Mather Memorial
Stone Guard Rail Behind Lodge
Stone Curbs and Parapet Walls
Stone Stairs in Auto Parking Area
Walls and Stairs to Sinnott Memorial
Plaza Comfort Station
Comfort Station behind the Cafeteria (Comfort Station No. 4)
Community House

Munson Valley
Administration Building
Ranger Dormitory
6 Employee's Residences
Superintendent's Residence
Meat House
Mess Hall
Road Culvert Head Walls
Trail Bridge
Rock Walls
Lady of The Woods
Naturalist's Residence
Comfort Station
Machine Shop
Transformer Building
Garage and Woodshed
Hospital
Warehouse

Rim Village and Munson Valley
5 Drinking Fountains

Rim Drive
Stone Retaining Walls and Pull-outs

Watchman Peak
Watchman Fire Lookout
Stone Parapet Walls and Trail (Watchman Lookout)

Garfield Peak
Stone Walls Around Reservoir

As a result of recently conducted condition assessments, possible additions to the LCS include the Wineglass Patrol Cabin (constructed in 1934) and the Mount Scott Lookout (constructed in 1952). Because the Goodbye Bridge (constructed in 1954) has been identified by personnel of the Historic American Engineering Record as the earliest glue-lam bridge in the national park system, it is likely that this structure will be added to the LCS in the future.

NATURAL RESOURCES

BIOTIC COMMUNITIES

The flora of Crater Lake National Park is typical of the vegetation found throughout the Southern Cascades. Generally, the vegetation of the region reflects a mosaic of forested areas and open non-forested areas. Climate, topography, soil development, and fire history all affect the composition and distribution of existing plant communities. Because of this natural species diversity, the park is regarded by many as a sanctuary for native forest and meadow communities, with limited introductions of non-native species. Approximately 20,250 hectares (50,000 acres) of late seral forest exist throughout the park. Fire suppression and historic logging activities have altered forest structure and species composition throughout portions of the park and surrounding areas.

Crater Lake National Park ranges in elevation from about 3,800 feet in the southwest corner of the park to just over 8,900 feet at Mount Scott. Most of the rim area is situated near the 7,000 foot elevation level, although, the Watchman and Hillman Peak areas on the western side of the lake are slightly in excess of 8,100 feet. Vegetation grades from a mixed conifer forest dominated by ponderosa pine at the south entrance to high elevation mountain hemlock and whitebark pine forest at the rim. Other forest types include lodgepole pine, white fir, Douglas fir, and shasta red fir.

Ponderosa pine forest principally occurs on the southeastern edge and northeastern corner of the park, up to elevations of 5,500 feet. The ponderosa pine is commonly associated with white fir and in the lower elevations with sugar pine and some Douglas fir. Along the margin of ponderosa pine communities, particularly at meadow edges where cold air tends to have a large ecological effect, lodgepole pine may be found in association with ponderosa pine. The white fir forest is concentrated in the southern portion of the Park and has a major component of ponderosa pine, as well as sugar pine. Historic fires favored the survival of pines over white fir, and most of these stands, concentrated in the southern portion of the park, were historically dominated by ponderosa pine. The Douglas-fir type is not a common type in the park and occurs in relatively inaccessible areas in the southwestern portion of the Park, where it occurs in a complex mixture with red fir, climax lodgepole, and white fir forests. Increasing in elevation, lodgepole pine forest type sometimes covers vast areas and is found from 5,000-6,500 feet and is associated with shasta red fir and mountain hemlock.

Climbing still higher, to the very rim of Crater Lake, and up the slopes of the surrounding peaks, the forest becomes more scattered and the trees smaller and more stunted. Only a few species endure the low temperature, high winds, and deep snows at these altitudes, the principal ones being mountain hemlock, and white-bark pine. Mountain hemlock stands are the highest elevation continuous forests at Crater Lake and become dominant at about 6000 feet. Whitebark pine extends from about 7500 ft to the top of Mt. Scott, the highest point in the park (8,929 ft) and is more an open woodland than a forest. Whitebark pine is uncommon in the park and is in decline throughout its range due to a non-native pathogen that causes white pine blister rust in five-needle pines. Information is being collected throughout the Cascades Range that will help land managers to develop appropriate

management plans to provide for preservation of this species.

The abundant and diverse vegetation of the park constitutes a large block of relatively undisturbed habitat that supports various populations of native wildlife species. The park has significant populations of Roosevelt elk, black tail deer, pronghorn, coyote, and porcupine. Periodic sightings of black bear, pine marten, weasel, and mountain lion are reported in the summer months. A variety of other small animal species are seen in the backcountry of the Park.

Soil properties are integral components of determining the species diversity, productivity, and regenerative capacity of vegetation types. Therefore soil resources are also included in this impact topic. The Natural Resources Conservation Service (NRCS) completed inventory and mapping of the soils of Crater Lake National Park in 2001. Twelve soil types that fall into six general categories were identified within the park. The categories are: 1) soils on uplands, formed in air-fall deposited ash and pumice; 2) soils on uplands, formed in air-fall deposited ash and pumice over glacial deposits; 3) soils in valleys, formed in ash flow deposits consisting of ash, pumice and cinders; 4) soils on cinder cones; 5) soils on upland meadows with intermingled forests; and 6) soils in seeps and on stream terraces. In general, the soils have a low water holding capacity and nutrient levels. These soil conditions combined with a short, relatively dry growing season make reestablishment of vegetation very difficult. Soils are in general not highly erodible.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

A number of species may be affected by the alternatives that are considered threatened or endangered in Oregon, that inhabit, or for which potential habitat exists in the park.

Table 5: Threatened, Endangered, and Sensitive Species

Species	Federal Status	State Status	Oregon Natural Heritage Program List*
Canada lynx *Lynx canadensis*	Threatened	Threatened	
California Wolverine *Gulo gulo luteus*	Species of Concern	Threatened	List 2
Pacific Fisher *Martes pennanti pacifica*	Species of Concern	Sensitive Species	List 2
Bald eagle *Haliaeetus leucocephalus*	Threatened	Threatened	List 2
Northern spotted owl *Strix occidentalis caurina*	Threatened	Threatened	List 1
Peregrine falcon *Falco peregrinus*		Endangered	List 2
Northern Goshawk *Accipiter gentilis*	Species of Concern	Sensitive Species	List 2
Bull Trout	Threatened	Sensitive Species	List 1

Species	Federal Status	State Status	Oregon Natural Heritage Program List*
Salvelinus confluentus (Klamath River and Columbia River population segments)			
Crater Lake rockcress *Arabis suffrutescens* var. *horizontalis*	Species of Concern	Candidate	List 1
Shasta arnica *Arnica vicosa*			List 2
Pumice grapefern *Botrychium pumicola*		Threatened	List 1

***List 1** contains taxa that are endangered or threatened throughout their range or which are presumed extinct. The status of taxa on this list represents its status throughout its range. **List 2** contains species that are threatened, endangered or possibly extirpated from Oregon, but are stable or more common elsewhere.

Canada Lynx

The park has over 34,000 acres of potential Canada lynx habitat, consisting of a mosaic of old growth stands providing denning sites and lodgepole forest and meadow foraging habitat. Although the park has conducted three years of extensive surveys for Canada lynx in the park, none have been detected. There is evidence from the past suggesting that lynx previously foraged in the park. The Smithsonian Institute has a Canada lynx pelt in its collection that dates back to 1898. It was trapped along the Wood River just south of the park. Lynx sightings have been reported in the Klamath Basin as recent as 2000, but have not been verified with other substantive evidence such as photos, tracks, or hair.

California Wolverine and Pacific Fisher

These species all have large home ranges, are capable of moving long distances, tend to avoid areas with human activity or development, and require relatively undisturbed habitats that are uncommon outside of the park. Because of large-scale loss of natural habitats throughout both species' ranges, the high-elevation coniferous forests of Crater Lake that provide forage, denning, and travel habitat for these small carnivores park may be important to their distribution and abundance in Oregon. Although information on these species is limited, old forest structure, including large woody debris for denning (both logs and snags), is an important structural characteristic of habitat for these animals. Ongoing surveys initiated over the past 5 years to determine if wolverines are present in the park have only detected pine martens, although a reliable siting of a wolverine was made in 2000 by a state biologist visiting the park.

Bald Eagle

There is a historic nest site on Wizard Island, and one currently active nest site along the shoreline of Crater Lake. Tour boats are restricted from areas on the lake that are near the nest site. The Klamath Basin has over 70 eagle nest sites and these birds forage in the park. Bald eagles are observed in the Park from early spring, April or May, to fall, usually sometime in October. None are present during the winter months.

Northern Spotted Owl

This old-growth dependent species is at the eastern end of its range in Crater Lake National Park. There are approximately 32,260 acres of lower elevation mixed conifer forests that are considered suitable spotted owl habitat in the Park. This habitat is found in patches throughout the park, with higher density of patches and larger patch sizes southwest of a diagonal line connecting the northwest and southeast corners of the park. All currently known nest locations have been found within areas identified as potential habitat on the west and south sides of the park, but occasional sightings have been documented outside of these areas. The park conducts an annual monitoring program to assess the nesting and reproductive status of owl pairs living in the park. Since 1992, 17 owl pairs have been tracked.

Northern Goshawk

This hawk is rare in Crater Lake National Park. Little is known of the specific habitat requirements for goshawks in Crater Lake National Park but the following general forest management activities are helpful in conserving habitat for Northern Goshawks: (1) retain the upper canopy trees at known or suspected nest sites; (2) retain down wood and logs for prey, particularly squirrel species; and (3) manage stands for understory removal and canopy retention.

Peregrine Falcon

Peregrines nest on cliffs, often near water and forage on a diverse avian prey base. Most habitat and reported activity in the park are from within the caldera. One active peregrine nest site exists within the caldera. Tour boats are restricted from areas on the lake that are near the nest site. There are many potential nest sites available on the cliffs in the caldera. The park conducts annual monitoring of falcon habitat, to determine relative abundance within the park.

Bull Trout

The bull trout is the only known fish species native to Crater Lake National Park. Bull trout are located only in Sun and Lost Creeks. Annie Creek is also within this species range and is considered bull trout habitat, although bull trout do not currently occur there. The park has an active restoration program in progress. This program has resulted in elimination of non-native brook trout from Sun Creek 2000. Follow-up surveys indicate that bull trout are responding well in the wake of their restoration in the creek.

Pumice Grapefern, Shasta Arnica, and Crater Lake Rockcress

All three plants occur in isolated populations along the rim. Pumice grapefern is endemic to raw pumice-gravel substrates which are subject to harsh climatic extremes (intense sunlight, dessicating winds, cold nights, etc.). Shasta arnica occurs on dry talus slopes of the rim, often with an eastern aspect. Crater Lake rockcress is found in dry, rocky pumice and intermixed with sparse, open, mountain hemlock forest.

WATER RESOURCES

Crater Lake is near the midpoint of the Sierra Cascade Mountain province of the Pacific mountain system. The park is influenced by Pacific Ocean weather. The majority of storm fronts that pass the north Pacific Coast each winter will result in moisture at Crater Lake. Summer

weather is generally mild with clear skies except for occasional thunderstorms, which seldom occur with enough force or volume to produce damaging rains or hail. Daytime summer high temperatures usually range from 60°F (15°C) to 70°F (21°C) and seldom exceed 85°F (29.4°C). Approximately 70% of the annual precipitation falls from November through March, with less than 6% from June through August. During the dry months — June, July, and August — an average of only five days will have precipitation greater than 0.10 inch. Snow has fallen every month of the year. Annual snowfalls can total over 800 inches, and long-lasting snow depths of 100 to 200 inches accumulate.

Waters from the slopes of Mt. Mazama flow into the Klamath, Rogue, and Umpqua River Systems. Runoff channels are broad and poorly defined with rounded contours. This is because surface runoff in the Park from rain and melting snow is negligible. Water sinks almost immediately into the porous volcanic soils and glacial debris and is released only slowly through evaporation, plant use, seeps, and a few springs, some of which emerge within the caldera and flow directly into the lake.

Annie Spring, near the Mazama campground, has been the park's water supply since 1976. Water is pumped from the spring to storage facilities at Rim Village, Mazama Village, and Munson Valley. The source of water for Annie Spring is shallow groundwater originating as snowmelt; the spring's output is reduced during years when the winter snowpack is low (Century West Engineering Corporation 1994). The average low flow is about 1,565,000 gpd, or 2.4 cfs. Annie Creek joins with the Wood River and eventually flows into the Klamath River system south of the park.

Crater Lake

Crater Lake lies inside the caldera of Mount Mazama and is surrounded by steep-walled cliffs that range from 500 to 2,000 feet above the lake's surface. At 1,943 feet, it is the seventh deepest lake in the world and the deepest in the United States and noted for its extreme water clarity and deep blue color. The lake has no surface outflows and only minor surface groundwater inflows as springs along the caldera walls. The main source of water for the lake is precipitation, averaging 70 inches per year.

Results of the ongoing Crater Lake Long-Term Limnological Program indicate that Crater Lake is a complex and dynamic system. No unidirectional change in the parameters monitored (lake and spring water chemistry, nutrients, chlorophyll, primary productivity, phytoplankton, zooplankton, fish, water clarity, light penetration, and temperature) has been detected. The monitoring program has also provided valuable data and recommendations on a number of other management issues including the extent and significance of submerged hydrothermal resources (relative to a proposed geothermal power development along the park boundary), boat and automobile petroleum hydrocarbon inputs to the lake, water quality of springs entering the lake below developed areas along the caldera rim, and the potential impact of introduced fishes.

AIR QUALITY

Crater Lake National Park is a class I air shed designated by the 1977 Clean Air Act amendments. As a class I area, the park is subject to the most stringent regulations of any designation. Results from the park's air quality monitoring indicate that the

condition of the park's airshed is good, one of the cleanest airsheds in the U. S. There is relatively little impact from fine particulates and visibility is high. The elevation and geography make the park susceptible to winds, which tend to disperse particulates and other pollutants. The clean air allows spectacular views of the surrounding Cascades and Klamath Basin. A major air quality concern is the pollutants from industrial areas introduced at Crater Lake in the form of acid rain and snow. These pollutants threaten both land and water resources, particularly the lake clarity.

VISITORS AND THE PARK

OVERVIEW

Visitors primarily come to Crater Lake National Park to view the lake. As one of the first national parks, Crater Lake was the focus of early NPS publicity efforts to promote visitation. Since the establishment of the park in 1902, Crater Lake has been accessible by automobile, and the park's road system has enabled visitors to drive to scenic destinations within the park, including Annie Spring, Munson Valley, and parts of the crater rim. In 1917 the Park Service issued an automobile guide map to the park's features and successfully promoted visitation to the park in combination with travel on the Southern Pacific Railroad. Early 20th century visitation to the park was also encouraged by the National Parks Highway Association with the development of an automobile tour path linking western national parks in a route that became known as the Park Highway. In combination with road accessibility the park also offered visitor accommodations at campgrounds and concessioner lodging which supported travel to Crater Lake National Park.

Visitation to Crater Lake National Park in the early years was restricted by the relative isolation of the park and the long snowy winters that limited the travel season to a few short months in the summer. Due to heavy snow loads, roads into the park were often not in condition for regular travel until July or August and were frequently closed by October. With the development of Rim Village at the crater in the 1920s, visitation to the park steadily increased. It was possible to drive completely around the lake beginning in 1918 and visitors did so while the Rim Drive was being built. In the winter of 1935 1936, the highway into the park from Medford and Klamath Falls was kept open, making the park accessible to motorists the entire year for the first time in the park's history. In the late 1930s, the Rim Road was extended and improved enhancing the visitors' drive around the lake during the summer months. Weather continues to play a role in determining the extent of park visitation and shaping the visitor experience.

The number of park visits continued to increase in the years before World War II, and visitor use of the park expanded to include winter snow play as well as summer season activities of nature-viewing, camping, hiking, and auto-touring. Following the war, as visitation to the park returned to pre-war numbers, improvements were made to the park's roads and to visitor accommodations. Annual park visitation reached a plateau of 500,000 in the early 1960s but can fluctuate as much as 25% from year to year. Visitation did reach a high near 700,000 in the 1970s. In 2000 park visitation was 432,993.

Based on a continuation of existing trends in visitation, the number of visitors to the park is expected to increase slightly over the long term and continue to fluctuate from year to year. It is anticipated that the bulk of visitation to the park will continue to occur in June, July, and August and that most visits would continue to be less than four hours in duration. Any increase in annual visitation would likely result in more visitors during peak-use days within the peak period, and would continue to be concentrated between 10:00 A.M. and 4:00

P.M. Developed areas in the park, including Mazama Village, Munson Valley, and Rim Village, would continue to be popular and could see increased use. Increases in annual visitation could also result in more visitor use on off-peak days. There could also be more visitation during the limited spring and fall shoulder seasons.

Crater Lake National Pak is a vital element in the regional recreational environment. Many high quality recreational opportunities are available in or near the park and many visitors stop at the park as part of a north-south automobile trip. Seventy-five percent of visitors polled in the 2001 visitor survey said their primary reason for visiting the area was to visit Crater Lake National Park (*Crater Lake National Park Visitor Study*, 2001). The most common sources of information visitors use to plan a visit to Crater Lake National Park are travel guides and tour books as well as word of mouth. Three major rivers, the Rogue, Klamath, and Umpqua Rivers, flow through the region. To the east of the park seven wildlife refuges are located in the Klamath Basin. The area offers summer and winter attractions, including cultural events, boating and rafting, hiking, fishing, hunting, and skiing. Regional visitors tend to visit other areas for specific activities, but include Crater Lake in their itinerary.

WHO VISITS THE PARK AND WHEN THEY COME

In the summer of 2001, the University of Idaho Cooperative Park Studies Unit gathered demographic information about visitors to Crater Lake National Park. The survey was conducted August 3rd through the 9th in the summer of 2001. A total of 656 visitor groups were contacted, 600 of these groups agreed to participate in the survey, and 484 questionnaires were completed and returned for a response rate of 80.7%. The study found that a majority of visitors (71%) were from the states of Oregon, California, and Washington. International visitors represent 3% of the total park visitation. Slightly over one-third (36%) of international visitors to the park are from Canada. The majority of visitors surveyed (65%) indicated that they were either first-time visitors to the park or had not visited the park within the past two to five years. Over half of all visitors to the park (59%) are older than 36 years of age. Children, ages 15 or younger, representing a fifth (20%) of the visiting public. At least 70% of visitors to the park identified themselves as family groups, 14% as friends, and 8% as being by themselves. Less than 2% of park visitors indicated that they were with a guided tour group.

The 2001 survey found that Crater Lake National Park is principally a day use area. Eighty-one percent of visitors to the park spend less than a day. For most visitors, the park is a stopover rather than a terminal destination area, however, 75% of visitors indicated that Crater Lake National Park was the primary reason for their visit to the region and 39% of respondents stay at least one night outside the park. Visitation to the park is highest between Memorial Day and Labor Day. Fifty-six percent of visitors spend four or more hours in the park and 75% of all visits occur during a five-hour period in the middle of the day (10:00 A.M. to 3:00 P.M.). Weather restricts access to the park during the winter months. Rim Drive is closed by snow usually from mid-October to early July. Vehicle access during the winter is maintained only from the south and west on Route 62 to Rim Village. Road closures, particularly between Munson Valley and the rim, are common during the

winter and closures of up to three days are not unusual.

DIVERSITY OF RECREATIONAL OPPORTUNITIES

The 2001 visitor survey profiled Crater Lake National Park visitors to better understand the experiences that visitors sought and attained. Information was gathered on what activities visitors engaged in, places visited, areas of the park visited, the use and importance of interpretation and park orientation, visitor facilities and services, and the importance of selected visitor experience values.

The 2001 survey found that the most common visitor activities are scenic driving (94%), viewing Crater Lake (71%), and photography (63%). The least common activity is overnight backpacking. Other visitor activities included swimming, shopping, watching the orientation film at the visitor center, and hiking down to the lake at Cleetwood Cove. The most common activity during the winter is cross-country skiing and the least common winter activity is snowshoeing. The most visited places in the park are Rim Village (85%), West Rim Drive (70%), and Rim Village Visitor Center (61%). East Rim Drive receives about 25% less use than the West Rim Drive. Grayback Motor Nature Trail is the least used road. During the summer, there is moderate use of the short interpretive trails along the crater rim. Hiking, taking the boat tour, viewing the lake, picnicking, attending ranger-lead activities, nature study, and overnight backpacking were identified as less important, but desired activities for future visits to the park.

VISITOR ACCESS AND CIRCULATION

For the majority of visitors park roads mold and define the visitor experience. The 2001 visitor use survey indicates that Crater Lake National Park is primarily a day use area for approximately 81% of its annual visitors and that a stop at Crater Lake is a part of a north-south auto trip. Most visitors arrive at the park during the summer months and auto touring remains the predominant visitor activity. In the summer, automobile access to Crater Lake National Park from the north is via Oregon Route 138, from the south the park is reached via Oregon Route 62 from Medford and Klamath Falls.

The park entrance at Annie Spring is 76 miles from Medford and 56 miles from Klamath Falls. The most used entrance into the park is the South Entrance Road from Highway 62, followed by the North Entrance from Highway 97. The most used exit from the park is the North Entrance to Highway 97. Both the south and north access roads lead to Rim Drive, a 33-mile road encircling the caldera rim. Numerous pullouts and/or parking areas along Rim Drive provide scenic lake views. The Pinnacles Road is a 6-mile spur road from Rim Drive that leads to an area of volcanic spires known as The Pinnacles. The 10-mile North Entrance road crosses the Pumice Desert. The 4-mile South Entrance road follows Annie Creek Canyon. The 3.5-mile gravel surfaced Grayback Drive diverges from East Rim Drive at Vidae Falls, crosses Grayback Ridge, and connects with the Pinnacles Road at Lost Creek Campground.

Rim Drive at Crater Lake National Park is linked to other Cascade Mountain volcanic areas by its 1997 designation by the Oregon Department of Transportation

as part of the Volcanic Legacy Scenic Byway. The Volcanic Legacy Scenic Byway joins the Shasta Volcanic Scenic Byway at Highway 97 at the Oregon border. These scenic byways connect Crater Lake National Park with Lassen Volcanic National Park in Shasta County, California and extend the "volcano to volcano" connection. In 1998, the Federal Highway Administration named Rim Drive an All-American Road. Rim Drive receives one of the highest visitor uses in the park. During the summer months scenic pullouts and parking areas along Rim Drive can become crowded. Parking areas subject to crowding include Cleetwood, Phantom Ship Overlook, and the Watchman. Because it is located at the only access point to the lakeshore, Cleetwood Trail parking is especially prone to congestion because boat tour participants and hikers compete for parking spaces. Parking at Rim Village and Mazama Village is also congested during the summer months.

Almost one-half of visitors (48%) participating in the 2001 survey said it was unlikely that they would be willing to ride a shuttle bus rather than drive their own vehicle on Rim Drive. Forty-six percent of the visitors said they would be willing to ride a shuttle bus around Rim Drive if it included a park interpreter to inform them as they traveled around the lake. Although most visitors indicated they had not visited Crater Lake in the winter, 51% said they would be willing to pay a modest fee to take an over-snow vehicle to the rim in winter.

Visitors can access a minimally altered environment from frontcountry trails. The main access to the backcountry is from the Pacific Crest Trail that bisects the park north to south. The park has approximately 20 miles of frontcountry hiking trails, most of which are accessed from Rim Drive. Crater rim trails ascend Garfield Peak, the Watchman, and Mount Scott, which is the highest point in the park. There is moderate use of these front-country trails. The one-mile Cleetwood Trail receives more use than other rim trails because it provides the only access to the lake. Other short interpretive trails are located near Mazama Village at Godfrey Glen and Annie Creek. A short trail at Munson Valley, the Castle Crest Trail, introduces visitors to park flora. There is also a park headquarters historic walking tour available that involves a loop trail that goes past the Lady of the Woods. Twenty-six miles of the Pacific Crest Trail traverse the park. The Pacific Crest Trail and the Bald Crater Loop trail are the only trails in the park that allows stock use. Backcountry trails, most originally built in the 1930s, crisscross the backcountry connecting with the Pacific Crest Trail. The most commonly hiked trails in the park are Cleetwood Cove Lake Trail, Watchman Peak, and Castle Crest Wildflower Trail. The least hiked trail is the Munson Valley Historical Trail. Other trails receiving moderate use are Wizard Island, Rim Trail, Sun Notch, and Pinnacles Trail (NPS, Crater Lake NP Visitor Study, 2001). Park facilities accessible to visitors with disabilities include road scenic pullouts, the visitor information building, and some frontcountry trails, primarily at Rim Village.

Boat tours on the lake were initiated in 1907 to provide an opportunity for visitors to better experience the lake and caldera. The boat tour operation was moved from the Rim Village area to Cleetwood Cove in 1960 to take advantage of a less steep grade and a southern exposure for the access trail to the lake. The Cleetwood Trail is about a mile long and provides the only access to the lake. From mid to late June

through September the concessioner offers 1 ½ hour commercial boat tours of the lake accompanied by an NPS interpreter. The boat tour begins at Cleetwood Cove and circles the inside of the caldera with a stop at Wizard Island and a close-up look at a rock formation in the lake known as Phantom Ship. The concession-owned tour boats accommodate 48 passengers. There are seven boat tours a day. Limited parking for the tours is available at the rim, however the Cleetwood parking lot is often congested and many visitors park along Rim Drive when spaces in the parking lot are unavailable.

Access to winter recreational opportunities at the rim, including cross-country skiing and snow play on unplowed roads, occurs during the winter months. The Munson Valley Road to Rim Village is kept open during the winter months. Rim Village remains the focal point of visitor activity; however snow levels usually reduce lake-viewing opportunities. Viewing the lake from Rim Village in winter can be difficult because of snow levels and accumulated snow from plowing operations. Currently a large metal pipe culvert is placed on supports at the edge of the rim to create a tunnel through the snow bank allowing visitors a view of the lake. In heavy snowfalls the viewing window on the culvert can become obstructed. Snowmobiles are permitted on the North Entrance road. A snowmobile study conducted at the park in 1997 estimated that about 3,500 snowmobile visitors entered the park from November to April that year. The park issues incidental business permits for snowmobile and snow-cat tours along the North Entrance Road, as well as for cross-country skiing operations within the park.

EDUCATION/INTERPRETATION AND ORIENTATION

Education/interpretation and orientation to the park are provided throughout the year, however most interpretative activities occur during the summer. During the summer passive interpretation is provided at observation areas along the rim. Sinnott Memorial, on a precipitous cliff overlooking the lake, provides visitors with unobstructed views of Crater Lake. Interpretive talks are presented here during the summer. Two visitor centers, one at Munson Valley and one at Rim Village, provide orientation to the park during the summer. Interpretive activities also take place on boat tours operated by the park concessioner, and on ranger-led walks and talks on frontcountry trails and at a campground amphitheater.

Education/interpretation and orientation opportunities at the park are reduced during the winter. Winter orientation to the park is provided at the Visitor Information Building at Munson Valley. The only visitor facility open year-round at Rim Village is the concessioner - operated cafeteria. Interpretative outreach programs are conducted throughout the year, with a primary focus during the winter when programs are made available to schools.

SOUNDSCAPES AND SCENIC QUALITY

The 2001 visitor survey asked respondents to rate the importance of ten selected park attributes. Attributes that received a high importance rating include natural quiet / sounds of nature and solitude. Eighty-nine percent of respondents to the 2001 visitor survey indicated that natural quiet and sounds of nature were either very or extremely important park attributes that

should be considered in preservation planning for Crater Lake National Park. Seventy-five percent of participants stated that solitude was either a very or an extremely important park attribute. The predominant visitor activity at Crater Lake National Park is lake viewing. Ninety-four percent of respondents reporting sightseeing and scenic driving as very important activities during their visit. In addition, 63% of visitors indicated that sightseeing and scenic driving would be important parts of any future visits to the park.

Expansion of parking at Rim Village has resulted in an expanse of asphalt and a concentration of visitors at the rim. During the summer pedestrians at Rim Village are constantly exposed to the sight, sound, and smell of vehicle traffic and must cross traffic lanes and parking areas to reach lake viewpoints and scattered facilities. Rim Drive hugs the caldera rim for much of its length although there are quite a few stretches where a view of the lake is not possible from the road. Development of the Rim Drive and its associated overlooks and pullouts at The Watchman, North Junction, Steel Bay, Cleetwood Cove, Grotto Cove, Skell Head, Cloudcap Overlook, Cottage Rocks, Sentinel Point, Reflection Point, Kerr Notch, Phantom Ship Overlook, and Discovery Point has concentrated lake- viewing opportunities and trail access to a few areas. Excellent opportunities to experience natural soundscapes and scenic views are abundant in the backcountry, but a view of the lake is always shared with the sight and sounds of motor vehicle traffic.

OPERATIONS

PARK OPERATIONS

Crater Lake National Park is managed by a park superintendent headquartered at Munson Valley. The superintendent is responsible for the day-to-day operations of the park and is supported by a concessions manager and secretary. Management of the park is organized into the following divisions: administration, resource and visitor protection, resource preservation and research, maintenance, and interpretation / cultural resources. Staff in each division is stationed at park headquarters. Satellite offices are also maintained by some divisions at Klamath Falls and at Ashland.

Administrative functions, including payroll, budget and finance, procurement, contracting, property management, information technology services, and human resources, are accomplished at park headquarters. There are eight administrative personnel.

The Resource and Visitor Protection Division manages for resource protection and visitor safety and experience. Responsibilities include various visitor management and resource protection duties, including enforcing laws, resolving disputes, providing emergency medical services, fighting structural fires, managing visitor use in the park, building and maintaining trails, educating visitors about park resources, and performing search-and-rescue activities. Staff in this division also participate in resource management activities, including fire and wilderness management. There are 12 permanent resource and visitor protection staff employees. Another 35 seasonal employees work for the division during the summer months, and about 50 volunteers support the work of this division throughout the year.

The Resource Preservation and Research Division is responsible for preserving and managing the natural resources of the park and coordinating scientific research. They are responsible for resource inventory, monitoring and evaluation, impacts mitigation, restoration, and wildlife management. Facilities necessary to support resources management activities and programs include office and storage space, vehicle parking, and employee housing. Eight permanent or term and approximately 10 seasonal Crater Lake employees are currently assigned to the Resource Preservation and Research Division. Several of the natural resource management staff also work at offices in Klamath Falls and Ashland, Oregon.

Maintenan*ce* staff conducts preventive and corrective maintenance on park infrastructure and equipment. Park infrastructure includes water, wastewater treatment facilities, electric utilities, roads, parking, campgrounds, administrative and public buildings and structures within the park, and employee housing. All maintenance operations are based in Munson Valley.

The Maintenance Division includes the following functions:

- Buildings and utilities function maintains structures, housing, campgrounds, and park utility infrastructure.
- Roads function has responsibility for preventive and corrective maintenance on NPS administered roads. An important function of this branch is snow removal on park roads and responsibility for equipment maintenance.

Facilities that support the needs of the maintenance staff include equipment and replacement parts storage, vehicle maintenance and repair shops, parts and supplies storage, warehouse facilities, boneyards, and office space. Approximately 20 permanent and 20 seasonal employees are currently assigned to the Facilities Management Division.

Interpretation and Cultural Resources Management staff facilitates connections between the public and park resources through programs, exhibits, written material, and the park's website. This staff also provides for the preservation and management of the park's cultural resources, including historic structures, cultural landscapes, museum and archives collection, and archeological sites.

Interpretive programs are presented in the park on a regular schedule during the summer months, and educational outreach programs are conducted throughout the year. Summer programs include ranger-led walks, talks, boat tours, and children's activities. Snowshoe walks are conducted for the public and school groups during the winter.

Facilities associated with interpretive programs include two visitor centers, one public museum with interpretive exhibits, one building for hosting programs and exhibits, and one amphitheatre. Other facilities include the park library and the museum and archives collection. One employee provides division management and is split between the disciplines of interpretation and education and cultural resources. Two full-time employees are currently assigned to interpretation and education, while the park historian and museum curator focus on cultural resource functions. Typically this division hires approximately 12 seasonal interpretive employees. A seasonal archeologist is hired when project funding is available.

CONCESSION OPERATIONS

All concession facilities and services at Crater Lake National Park take place at Rim Village, Mazama Village, and Cleetwood and are operated by a private concessioner. The park's concessioner is Xanterra Parks and Resorts. Snacks, meals, and gifts are sold daily in Rim Village. During the summer season at Mazama Village, camper supplies, gifts, and snacks are sold. The summer season concession operations is generally from mid-May through mid-October. Depending on snow conditions, the concessioner may open earlier in the spring or stay open later in the fall. Traditionally, the concessioner generates more than 90% of its total sales during the summer season. In the winter, most concessioner facilities are closed by heavy snow. Although the road to Rim

Village is maintained and plowed by the park, the low visitation and frequent weather closures necessitate the reduction in the level of service at the rim. The cafeteria and gift shop, located in one multipurpose building, offer limited food and gift shop services, and also serve as the concessioner warehouse and storage facility. Winter hours at the Rim Village cafeteria and gift shop are 10:00 A.M. to 4:30 P.M. snow conditions permitting. No concessioner-provided lodging is available in the park during the winter.

Crater Lake Lodge, located at the crater rim, offers summer season accommodation and dining from mid-May to late September or mid-October. The lodge has 71 guestrooms and a 78-seat restaurant and bar. The concessioner employs approximately 240 staff, many of whom are housed in an employee dormitory on the east side of Rim Village.
The concession operation at Mazama Village includes operation of the 213-site Mazama Campground and a camper services building providing a grocery and sundries store for camper supplies, coin-operated public showers and laundry, a commercial laundry, and limited snack food services. The store at Mazama Village is open from early June to mid-October. The camper services building serves as the concessioner's only laundry facility for the lodge and the concessioner-constructed 40-unit Mazama Village Motor Inn. Other concession-operated visitor services at Mazama Village include a gasoline station. Like Rim Village, Mazama Village is open only in the summer . Lodging at the motel is available from early June to mid-October.

Cleetwood is on the north shore of Crater Lake and is accessed from Rim Drive. It is about 6 miles east of the North Junction where Rim Drive intersects the North Entrance Road. Cleetwood includes a parking area, a nonpermanent ticket sales structure, and a portable restroom at the rim. A trail descends the side of the caldera to the lake. The concessioner offers commercial boat tours of the lake accompanied by NPS interpreters. The concessioner owns and operates three 48-passenger boats from mid- to late June through mid-September. There are seven scheduled boat tours, plus one trip to Wizard Island for passenger pickup. During the winter months the boats and other equipment are stored at docking facilities on Wizard Island.

PARK INFRASTRUCTURE AND FACILITIES

Crater Lake National Park's List of Classified Structures (LCS) includes 38 structures ranging from comfort stations to the Crater Lake Lodge. The LCS is an evaluated inventory of all historic and prehistoric structures that have historical, architectural and/or engineering significance within the park. Twelve listed structures are located at Rim Village. These include Kiser Studio Building, Sinnott Memorial, Comfort Station, Walls and Stairs to Sinnott Memorial, Sinnott Plaque, Stone Curbs and Parapet Walls, Stone Guard Rail behind Lodge, Mather Memorial Drinking Fountains, and Crater Lake Lodge. Twenty-two of the listed structures are located in the Munson Valley Historic District. These include the Administration Building, Ranger Dormitory (Steel Information Center), Mess Hall, Warehouse, Machine Shop, Meat House, superintendent's residence, Naturalist's Residence, six employee residences, garage and woodshed, hospital, Transformer Building, Comfort Station, and Lady of the Woods. Also located in Munson Valley is the main maintenance facility containing vehicle

repair and parking bays, shops, and equipment storage. Permanent housing is located at Steel Circle near the Munson Valley Historic District. There are seven duplex housing structures representing a total of 14 residences along Steel Circle as well as a community building. Across the South Entrance Road from Steel Circle is a group of eight duplexes with 16 residential units built in the 1970s and currently used primarily for seasonal housing known as Sleepy Hollow. Structures located on or near Rim Drive include Watchman Fire Lookout, Stone Parapet Walls and Trail at Watchman, and Stone Retaining Walls and Pull Outs along Rim Drive.

Annie Spring, located near the Mazama campground, has supplied high-quality water to the park since the 1870s. Water is pumped from the spring to storage facilities at Rim Village, Mazama Village and Munson Valley. The park operates three water treatment facilities. Two are located under the bridge near the Annie Spring water intake and one is located at Lost Creek Campground. The two Annie Springs water treatment facilities serve Mazama Village, Munson Valley, and Rim Village. The Lost Creek Campground water treatment facility serves only Lost Creek Campground. The park operates two sewage treatment systems. One is south of Steel Circle and serves Park Headquarters and Rim Village. This system has four lagoons. The second sewage treatment system is located southeast of the Mazama Dormitory Complex and serves all of Mazama Village. This system has three lagoons. There is a septic system near Lost Creek Campground to serve Lost Creek Campground.

Crater Lake National Park has approximately 84 miles of roads. The road system within the park is generally in fair condition. The system has some safety and operational issues, including areas that are difficult to clear of snow. Seventy miles of primary roads, of which the circuit around the rim accounts for a little over 32 miles, comprise the bulk of the road system. Secondary and paved service roads in the park amount to about 14 miles. The primary roads in the park were designed and constructed to provide visitor access to the park's scenic features which are mostly concentrated along the rim of Crater Lake. In the winter snowplowing operations keep access to the rim open via Oregon Route 62 and the Munson Valley road to the rim.

There are 97 miles of maintained hiking trails in the park. Of this total, 77 trail miles are designated backcountry trails, including 33 miles of the Pacific Crest Trail (PCT) which bisects the park from north to south. The remaining 20 miles of maintained trails are front-country trails. In addition to the maintained trails, there are also 63 miles of unmaintained backcountry trails. Trails are only maintained during the summer months. In the winter, when Rim Drive is covered with snow, it is used for cross-country skiing and in effect becomes a designated winter-use trail.

SOCIOECONOMIC ENVIRONMENT

INTRODUCTION

Crater Lake National Park is located in southwest Oregon astride the Cascade Mountain Range. This rectangular shaped park is completely bordered by state and national forests. Rouge River National Forest abuts the park on the west and parts of the north and south sides. Umpqua National Forest forms the middle third of the park's northern boundary. Winema National Forest borders the park on part of the north, almost all the east, and middle part of the south border. Sun Pass State Forest on southeast completes the public forest encirclement. Sky Lakes Wilderness (part of the Rouge River and Winema National Forests) is on the southern edge of the park and Mount Thielsen Wilderness (part of the Umpqua and Winema National Forests) lies to the north.

Access to the park is via State Route 138 through the north entrance or by State Route 62 from the west or south. The road from the north entrance and the crater rim road are open only during the summer season due to heavy snows. Highway 62 is open year round. The Pacific Crest National Scenic Trail runs north and south through the park with side trails leading to Crater Lake.

Most of the park is contained in west-central Klamath County with small areas spilling over into Douglas and Jackson Counties. The communities in these counties are closest to the park's boundaries and serve as gateways to the park, providing a variety of goods and services for visitors to the park. The park's location makes the three-county area the economic region under consideration for this planning effort. Any socioeconomic impacts from the action alternatives would have the most impact on these counties. Such impacts are marginalized farther from the park,

Klamath Falls is the county seat of Klamath County and is about 50 miles south of the park via route 62 and US 97. Medford (county seat of Jackson County) is about 75 miles southwest of the park, traveling west and then southwest on route 62. Visitors traveling north and then west about 100 miles on route 138 reach Roseburg, also a county seat. These three cities are primary business, transportation, and service centers in their respective counties.

A number of smaller unincorporated communities — Beaver Marsh, Diamond Lake, Fort Klamath, Prospect, and Union Creek — are much closer to the park. Beaver Marsh is northeast of the park about 19 miles from the north entrance.[1] The store and gas station have been closed for over three years. Less that 150 people live in Beaver Marsh. Diamond Lake is a resort community about 5 miles north of the north entrance. The resort structures and summer homes are within the Umpqua National Forest on land leased from the U.S. Forest Service. Year-round residents are estimated to be less that 20. Fort Klamath is approximately six miles south of the park astride Highway 62. There is a store and gas station. The 60 permanent residents are joined by summer folks to increase the population to about 200. Prospect is 12 miles south of Union Creek and about 20 miles from the park's

[1] Mark, Steve. May 2003. E-mail communication forwarded on May 27, 2003. Most of the information in this paragraph represents his personal knowledge of the area surrounding the park.

west entrance. A high school, several churches, a gas station, a store, and three restaurants are found here. This is the largest of the local gateway communities; having a population estimated at between 200 and 250 persons. Union Creek is also a resort and summer home community located within Rogue River National Forest on leased federal land managed by the U.S. Forest Service. The historic resort complex contains a store and there is also a restaurant nearby. Some government housing is found within this community. Approximately 50 permanent residents live here.

Population

The three counties in the affected region for socioeconomics are predominantly rural, with large areas in federal ownership as a national park and national forests (managed by the U.S. Forest Service). This three-county area had a combined population of more than 345,000 persons in the year 2000 (table 6). The three county seats accounted for 102,633 of these residents. The rest are scattered among many smaller communities. The population of the state of Oregon in 2000 was more than 3.4 million, which ranked it 27th in the nation. The affected three-county area contains about 10.1% of the state's population. This area grew at a much lower rate (15.6% compared to 20.4%) than the state as a whole during the 1990s. Only Jackson County, with an annual growth rate of 2.2%, led by Medford growing 34.5% over the decade, outpaced the state average (1.9%) for growth. Klamath and Douglas Counties had annual growth rates of only 1.0% and 0.6%.

TABLE 6: AFFECTED AREA POPULATION FOR COUNTIES AND SELECTED TOWNS

Counties/Cities	1990	2000	% Change 1990 to 2000	Annual rate of growth
Douglas County	94,649	100,399	6.1%	0.6%
Roseburg	17,032	20,017	17.5	1.6
Jackson County	146,389	181,269	23.8	2.2
Medford	46,951	63,154	34.5	3.0
Klamath County	57,702	63,775	10.5	1.0
Klamath Falls	17,737	19,462	9.7	0.9
Three-County Region	298,740	345,443	15.6	1.5
Oregon	2,842,321	3,421,399	20.4%	1.9%

Source: U.S. Census Bureau 2000a and 1990a.

MAJOR INDUSTRIES BY EARNINGS

Earnings are the sum of wage or salary income and the net income from self-employment. A person's earnings represent the amount of income received regularly before deductions for income taxes, social security, etc. In 2001, the most important industries for earnings in Douglas County were Manufacturing, Local Government, and Health Care and Social Assistance. These industries accounted for 44.2% of the total of $1.34 billion in earnings by county residents. Earnings for Klamath County were concentrated to a somewhat lesser degree (34.4% of the total of $0.79 billion) in these same three industry sectors. Jackson County had the most earnings at $2.82 billion; which represented 57% of all earnings in the three-county region. The largest sectors in Jackson County were health care and social assistance, retail trade, and manufacturing. The regional total earnings were $4.95 billion. Douglas County contributed $1.34 billion or 27% and Klamath County accounted for about 16%, or $0.79 billion.

Regionally, the top industry sectors were health care and social assistance (12.6% of the total), manufacturing (12.3% of the total), local government (11.5% of the total), and close behind is retail trade (at 11.0% of the total). This region accounted for nearly 7.2% of Oregon's $69,035,322,000 total earnings in 2001.

MAJOR INDUSTRIES BY EMPLOYMENT

The affected region provided nearly 187,000 full- and part-time jobs in 2001. This figure represented about 9% of the state total of 2.1 million jobs. Retail trade, health care and social assistance, manufacturing, and local government were the sectors employing the most workers (about 43% of the total) in the region. Retail trade accounted for the most positions in Klamath and Jackson Counties (12.1% and 15.9% of the total). Retail trade was a close second in Douglas County providing 6,365 jobs (11.9% of the total) verses manufacturing's 6,365 (12.3% of the total). Over 55% of the region's jobs were in Jackson County; less than 18% were in Klamath County.

UNEMPLOYMENT

Oregon had an unemployment rate in 1990 that matched the national average unemployment rate of 5.6 % (see table 7). Unfortunately, each county had significantly higher unemployment rates. In fact, all three counties have had higher unemployment rates than the state and national averages for the selected years. The national average fell to 4.0% in 2000. However the next year it rose to 4.8%.

Unemployment rose and fell for the three counties and Oregon during the 1990s and continued this pattern in 2000 and 2001. In 2001 the state average and that of Jackson County both rose to 6.3%. Statewide, this unemployment rate represented about 115,300 persons being out of work. For Jackson County, out of a workforce of 91,900, nearly 5,800 people were looking for work but not finding suitable employment. Douglas and Jackson Counties' unemployment figures rose to 9.0% (almost 4,000 people) and 9.5% (nearly 2,700 people). With over 12,000 persons out of work, the regional unemployment rate for 2001 was over 7.5%, significantly higher than the state or national averages.

TABLE 7: UNEMPLOYMENT RATES FOR SELECTED YEARS

Area	1990	1993	1995	1997	2000	2001
Douglas County	10.2%	11.8%	8.0%	8.8%	7.8%	9.0%
Jackson County	6.8	8.6	6.5	7.6	5.3	6.3
Klamath County	9.1	10.9	7.4	9.8	8.1	9.5
Oregon	5.6	7.3	4.8	5.8	4.9	6.3
United States	5.6%	6.9%	5.6%	4.9%	4.0%	4.8%

Source: Bureau of Labor Statistics 2003

POVERTY

The national average for persons living in poverty in 1989 was 13.1% (table 8.). This figure represented 31.7 million people out of a population of 242.0 million. The poverty rate for Oregon was more than seven-tenths of a percentage point lower, at 12.4%. Over the years shown, the poverty rate for Oregon was consistently lower than the national rates. For the selected years, the poverty rates in the three counties were all higher than the state rates. For the most part the poverty rates in the counties were also higher than the national figures. In 1999 poverty in the three counties ranged from one person in eight in Jackson County to one person in six in Klamath County. These figures represented more than 47,500 people living in poverty in the region. This region accounted for more than 12.5% of all people living in poverty in Oregon in 1999.

TABLE 8: PERCENT OF PEOPLE LIVING IN POVERTY

Area	1989*	1993**	1995**	1997**	1999*
Douglas County	14.9%	15.6%	16.0%	14.6%	13.1%
Jackson County	13.2	14.4	14.6	13.8	12.5
Klamath County	16.7	17.1	17.2	15.9	16.8
Oregon	12.4	13.2	12.5	11.6	11.6
United States	13.1%	15.1%	13.8%	13.3%	12.4%

* = Census Data ** = Census Estimates
Source: US Census Bureau